

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE FORM PTO-1390 (Modified) (REV 11-2000)		ATTORNEY'S DOCKET NUMBER WAL-0007
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		U.S. APPLICATION NO. (IF KNOWN SEE 37 CFR 10/030505
INTERNATIONAL APPLICATION NO PCT/SE00/01248	INTERNATIONAL FILING DATE June 15, 2000	PRIORITY DATE CLAIMED July 8, 1999
TITLE OF INVENTION A METHOD OF PRODUCING A HOOD, AND A HOOD PRODUCED ACCORDING TO THE METHOD		
APPLICANT(S) FOR DO/EO/US MAGNUS ANDERSSON, ET AL.		
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:		
<ol style="list-style-type: none"> 1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371. 2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371. 3. <input checked="" type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)) The submission must include items (5), (6), (9) and (24) indicated below. 4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31). 5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> a. <input checked="" type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau) b. <input type="checkbox"/> has been communicated by the International Bureau. c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US) 6. <input type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)) <ol style="list-style-type: none"> a. <input type="checkbox"/> is attached hereto b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4). 7. <input type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3)) <ol style="list-style-type: none"> a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau) b. <input type="checkbox"/> have been communicated by the International Bureau. c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired. d. <input type="checkbox"/> have not been made and will not be made. 8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)). 9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). 10. <input type="checkbox"/> An English language translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)). 11. <input type="checkbox"/> A copy of the International Preliminary Examination Report (PCT/IPEA/409). 12. <input checked="" type="checkbox"/> A copy of the International Search Report (PCT/ISA/210). 		
Items 13 to 20 below concern document(s) or information included:		
<ol style="list-style-type: none"> 13. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98. 14. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included. 15. <input checked="" type="checkbox"/> A FIRST preliminary amendment. 16. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment. 17. <input type="checkbox"/> A substitute specification. 18. <input type="checkbox"/> A change of power of attorney and/or address letter. 19. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825. 20. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4). 21. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4). 22. <input checked="" type="checkbox"/> Certificate of Mailing by Express Mail 23. <input type="checkbox"/> Other items or information: 		

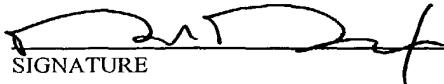
EL9141098241

"Express Mail" mailing label number
Date of Deposit January 8, 2002

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington D.C. 20591.

Jennifer Match
(typed or printed name of person mailing paper or fee)

(Signature of person mailing paper or fee)

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR 1.492(e)) 107050505		INTERNATIONAL APPLICATION NO PCT/SE00/01248	ATTORNEY'S DOCKET NUMBER WAL-0007
24. The following fees are submitted:		CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) :			
<input checked="" type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4)		\$1040.00 \$890.00 \$740.00 \$710.00 \$100.00 \$1,040.00	
ENTER APPROPRIATE BASIC FEE AMOUNT =		\$1,040.00	
Surcharge of \$130.00 for furnishing the oath or declaration later than months from the earliest claimed priority date (37 CFR 1.492 (e)).		<input type="checkbox"/> 20	<input type="checkbox"/> 30
		\$0.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE
Total claims	16 - 20 =	0	x \$18.00 \$0.00
Independent claims	1 - 3 =	0	x \$84.00 \$0.00
Multiple Dependent Claims (check if applicable).		<input type="checkbox"/> \$0.00	
TOTAL OF ABOVE CALCULATIONS =		\$1,040.00	
<input type="checkbox"/> Applicant claims small entity status See 37 CFR 1.27). The fees indicated above are reduced by 1/2.		\$0.00	
SUBTOTAL =		\$1,040.00	
Processing fee of \$130.00 for furnishing the English translation later than months from the earliest claimed priority date (37 CFR 1.492 (f)).		<input type="checkbox"/> 20	<input type="checkbox"/> 30
		\$0.00	
TOTAL NATIONAL FEE =		\$1,040.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable).		<input type="checkbox"/> \$0.00	
TOTAL FEES ENCLOSED =		\$1,040.00	
		Amount to be: refunded	\$
		charged	\$
a. <input checked="" type="checkbox"/> A check in the amount of <u>\$1,040.00</u> to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No <u>06-1130</u> A duplicate copy of this sheet is enclosed. d. <input type="checkbox"/> Fees are to be charged to a credit card. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.			
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.			
SEND ALL CORRESPONDENCE TO:			
Daniel F. Drexler CANTOR COLBURN LLP 55 Griffin Road Bloomfield, CT 06002 Telephone: 860-286-2929 Customer No. 23413			
 SIGNATURE Daniel F. Drexler NAME 47,535 REGISTRATION NUMBER January 8, 2002 DATE			

107050505
531 Rec'd PCT 08 JAN 2002

Express Mail Label #EL914109824US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: MAGNUS ANDERSSON, ET AL.

FOR: A METHOD OF PRODUCING A HOOD, AND A HOOD PRODUCED
ACCORDING TO THE METHOD

DOCKET NO.: WAL-0007

AMENDMENT

The Assistant Commissioner of
Patents and Trademarks
Washington, DC 20231

Dear Sir:

Before examining the present application, please amend the specification and claims as follows:

IN THE SPECIFICATION:

Please replace the section title before the first paragraph on the first page with the following rewritten version:

--FIELD OF THE INVENTION--.

Please replace the section title between the second and third paragraphs on the first page with the following rewritten version:

--DESCRIPTION OF THE RELATED ART--.

EL914109824US
"Express Mail" mailing label number

Date of Deposit January 8, 2002

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Jennifer Matson
(Typed or printed name of person mailing paper or fee)

J. Matson
(Signature of person mailing paper or fee)

Please replace the section title between the third and fourth paragraphs on the second page with the following rewritten version:

-- SUMMARY OF THE INVENTION --.

Please replace the fourth paragraph on the second page with the following rewritten version:

--The present invention provides a method of manufacturing a hood which obviates the drawbacks inherent in hoods according to prior art technology, and in particular improves the sound-suppression capability of the hood. The present invention further provides extremely rational production of hoods, at the same time as these can be given an extremely aesthetically attractive appearance.--

Please replace the fifth paragraph on the second page with the following rewritten version:

--The present invention also obviates the drawbacks inherent in prior art designs and constructions, and in particular improves the sound-suppression capability of the hood. Finally, the present invention provides a the hood such that it may be manufactured economically and rationally in large series and that it may be given an aesthetically attractive exterior.--

Please delete the section title after the last complete paragraph on the second page.

Please replace the last paragraph on page 2 which continues onto page 3, with the following rewritten version:

-- More specifically, the invention provides a hood that is injection moulded to one single continuous piece using plastic materials with different properties in at least one respect.--

Please replace the section title beginning at line 18 on the third page with the following:

--BRIEF DESCRIPTION OF THE DRAWINGS--.

Please replace the section title before the first paragraph on the fourth page with the following:

--DETAILED DESCRIPTION OF THE INVENTION--.

IN THE CLAIMS:

Please replace claims 1-14 with the following re-written clean versions.

1. (Amended) A method of producing a hood for a hearing protector, comprising: injection moulding of plastic material into a single contiguous piece employing plastic materials with different properties in at least one respect.
2. (Amended) The method as claimed in Claim 1, wherein the plastic materials are employed in both homogeneous and in porous or foamed form.
3. (Amended) The method as claimed in Claim 1, wherein at least two different plastic materials are employed.
4. (Amended) The method as claimed in Claim 3, wherein plastic materials of different densities are employed.
5. (Amended) The method as claimed in Claim 3, wherein plastic materials of different hardnesses are employed.
6. (Amended) The method as claimed in Claim 3, wherein plastic materials with different modulus of elasticity are employed.
7. (Amended) A hood for hearing protector produced from plastic by injection moulding, comprising:

at least two mutually contiguous portions which comprise plastic materials with different properties in at least one respect.

8. (Amended) The hood as claimed in Claim 7, wherein the portions include an outer and an inner layer of a first plastic material with a first group of properties and an intermediate layer located therebetween and comprising a second plastic material with a second group of properties.

9. (Amended) The hood as claimed in Claim 8, wherein the outer and inner layers have a hardness greater than the intermediate layer.

10. (Amended) The hood as claimed in Claim 8, wherein the intermediate layer has a hardness greater than the outer and inner layers.

11. (Amended) The hood as claimed in Claim 7, wherein the portions include two material layers, of which at least one has surfaces which are free towards both an outside and an inside of the hood.

12. (Amended) The hood as claimed in Claim 7, wherein the portions include two material layers which both have surfaces which are free towards an outside of the hood and surfaces which are free towards the inside of the hood.

13. (Amended) The hood as claimed in Claim 7, wherein at least one portion comprises a different plastic material than another portion.

14. (Amended) The hood as claimed in Claim 7, wherein a portion is disposed along a peripheral edge of the hood, is produced from a soft and elastic material, and is designed for sealing against an abutment ring which is disposed along the peripheral edge of the hood and designed to abut against a head of a wearer of the hearing protector in which the hood is included.

Please insert the following newly added claims:

15. (Newly Added) The hood as claimed in claim 9, wherein the intermediate layer has a foam structure.
16. (Newly Added) The hood as claimed in claim 10, wherein the outer and inner layers have a foam structure.

IN THE ABSTRACT:

Please insert the following Abstract on clean page after the claims:

ABSTRACT

The disclosure relates to a method of producing a hood for a hearing protector by injection moulding of plastic material. The hood is injection moulded to a single contiguous piece employing at least two plastic materials possessing different properties in at least one respect. The plastic materials may be both homogeneous and in porous or foamed form. A hood for a hearing protector is produced from plastic by injection moulding. The hood includes at least two portions or layers which are united to one another. The portions or layers consist of plastic materials with different properties in at least one respect.

REMARKS

Applicants request entry of the present amendments that conform the claims to U.S. practice. No new matter is being introduced by this Amendment as antecedent support is set forth in the original specification and in the original claims.

Prosecution on the merits is respectfully requested.

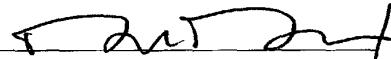
The Examiner is invited to contact Applicants' Attorneys at the below-listed telephone number regarding this Preliminary Amendment or otherwise regarding the present application.

If there are any charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicants' attorneys.

Respectfully submitted,

MAGNUS ANDERSSON, ET AL.

CANTOR COLBURN LLP
Applicants' Attorneys

By: 

Daniel F. Drexler
Registration No. 47,535
Customer No. 23413

Date: January 8, 2002
Address: 55 Griffin Road South, Bloomfield, CT 06002
Telephone: 860-286-2929

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The section title before the first paragraph on the first page is rewritten herein as follows:

“[TECHNICAL] FIELD OF THE INVENTION”

The section between the first and second paragraph title on the first page is rewritten as follows:

“[BACKGROUND] DESCRIPTION OF THE RELATED ART”

The section title between the third and fourth paragraphs on the second is rewritten herein as follows:

“SUMMARY OF THE INVENTION[PROBLEM STRUCTURE]”.

The fourth paragraph on the second page is rewritten herein as follows:
“The present invention [has for its object to form the method intimated by way of introduction such that it is possible, according to the] provides a method[, to] of manufacтур[e]ing a hood which obviates the drawbacks inherent in hoods according to prior art technology, and in particular[to] improves the sound-suppression capability of the hood. The present invention further [has for this object to form the method such that it permits] provides extremely rational production of hoods, at the same time as these can be given an extremely aesthetically attractive appearance.”

The fifth paragraph on the second page is rewritten herein as follows:
“The present invention also [has for its object to design the hood intimated by way of introduction such that this] obviates the drawbacks inherent in priori art designs and constructions, and in particular improves the sound-suppression capability of the hood. Finally, the present invention [also has for its object to design] provides a the hood such that [this] it may be manufactured economically and rationally in large series and that it may be given an aesthetically attractive exterior.”

The last paragraph on page 2, continuing onto page 3, is rewritten herein as follows:

“[The objects forming the basis of the present invention will be attained in respect of the method if this is characterized in that the]More specifically, the invention provides a hood that is injection moulded to one single continuous piece using plastic materials with different properties in at least one respect.”

The section title located after the last paragraph on the second page is rewritten as follows:

“**BRIEF DESCRIPTION OF THE [ACCOMPANYING] DRAWINGS**”

The section title located before the first complete paragraph on the third page is rewritten herein as follows:

“**DETAILED DESCRIPTION OF THE [PREFERRED EMBODIMENT] INVENTION**”

IN THE CLAIMS:

Claims 1-14 are re-written herein as follows:

1. (Marked Up/Amended) A method of producing a hood for a hearing protector, comprising: [the hood being produced by] injection moulding of plastic material[, characterised in that the hood is injection moulded to] into a single contiguous piece employing plastic materials with different properties in at least one respect.

2. (Marked Up/Amended) The method as claimed in Claim 1, [characterised in that] wherein the plastic materials are employed in both homogeneous and in porous or foamed form.

3. (Marked Up/Amended) The method as claimed in Claim 1 [or 2], [characterised in that] wherein at least two different plastic materials are employed.

4. (Marked Up/Amended) The method as claimed in Claim 3, [characterised in that] wherein plastic materials of different densities are employed.

5. (Marked Up/Amended) The method as claimed in Claim 3 [or 4], [characterised in that] wherein plastic materials of different hardnesses are employed.

6. (Marked Up/Amended) The method as claimed in [any of] Claim[s] 3 [to 5], [characterised in that] wherein plastic materials with different modulus of elasticity are employed.

7. (Marked Up/Amended) A hood for hearing protector[, the hood (1) being] produced from plastic by injection moulding, [characterised in that it includes] comprising:

at least two mutually contiguous portions [or layers (6, 7, 8; 10, 11; 13, 14)] which [consists of] comprise plastic materials with different properties in at least one respect.

8. (Marked Up/Amended) The hood as claimed in Claim 7, [characterised in that] wherein the portions include an outer and an inner layer [(6, 7, respectively)] of a first plastic material with a first group of properties and an intermediate layer [(8)] located therebetween and comprising [consisting of] a second plastic material with a second group of properties.

9. (Marked Up/Amended) The hood as claimed in Claim [7 or] 8, [characterised in that] wherein the outer and inner layers [(6, 7, respectively)] are relatively hard, while] have a hardness greater than the intermediate layer [(8) is softer or has foamed structure].

10. (Marked Up/Amended) The hood as claimed in Claim [7 or] 8, [characterised in that] wherein the intermediate layer [(8) is relatively hard while] has a

hardness greater than the outer and inner layers [(6, 7, respectively) are softer or have foamed structure].

11. (Marked Up/Amended) The hood as claimed in Claim 7, [characterised in that] wherein the portions include two material layers [(13, 14)], of which at least one has surfaces which are free towards both [the] an outside and an inside of the hood [(1) and towards its inside].

12. (Marked Up/Amended) The hood as claimed in Claim 7, [characterised in that] wherein the portions include two material layers [(13, 14)] which both have surfaces which are free towards [the] an outside of the hood [(1)] and surfaces which are free towards the inside of the hood.

13. (Marked Up/Amended) The hood as claimed in [any of] Claim[s] 7 [to 12], [characterised in that] wherein at least one [of the] portion[s] consists of] comprises a different plastic material than [the other/others] another portion.

14. (Marked Up/Amended) The hood as claimed in Claim[s] 7 [to 13], [characterised in that] wherein a portion [(13')] is disposed along [the] a peripheral edge [(4)] of the hood, is produced from a soft and elastic material, and is designed for sealing against [the] an abutment ring [(3)] which is disposed along the peripheral edge [(4)] of the hood [(1)] and designed to abut against [the] a head of [the] a wearer of the hearing protector in which the hood is included.

A METHOD OF PRODUCING A HOOD, AND A HOOD PRODUCED
ACCORDING TO THE METHOD

TECHNICAL FIELD

5

The present invention relates to a method of producing a hood for a hearing protector, the hood being produced by injection moulding of plastic material.

10 The present invention also relates to a hood for a hearing protector in which the hood is produced from plastic by injection moulding.

BACKGROUND ART

15 A multiplicity of various acoustic hoods are previously known in the art for use in hearing protectors. Such hoods may be simple and consist of a cup-shaped shell injection moulded from plastic which is secured in one end of an arc which is placed over the head of the wearer and which has a similar hood at its opposite end. The hoods are dimensioned to enclose the wearer's ears.

20 A hood consisting exclusively of a shell is, despite quite complicated configuration, readily subjected to vibrations and oscillations, throughout the entirety of the hood or only locally in it, which implies that the sound-suppression or sound insulation which the hood achieves will be unpredictable and uneven within various frequency ranges.

25

In order to obviate the above-mentioned problem, various inlays of different sound-absorbing materials have been placed interiorly in the hood. Such solutions also suffer from similar drawbacks.

30 EP 484 306 discloses a hearing protector in which the hoods have a hard outer shell, inside this a casing of compressed foamed plastic, and inside this casing a further hard hood, which realises compression of the foamed layer lying outside. Interiorly in the inner hood, a sound-absorbent material is then placed.

Such a construction functions considerably better than the above-described construction consisting merely of a shell which is provided interiorly with a sound-absorbent. However, the construction is not optimal, either as regards rational production or sound-suppression/sound-insulation.

5

Similar constructions are also known from USPS 2 684 067, DE 3 441 120, DE 3 441 122, and others.

For a hood to be as favourable as possible in a hearing protector, the material in 10 the hood should be "as dead as possible" so that it has a very slight ability to be excited into oscillation movements both as an entity and also locally.

PROBLEM STRUCTURE

15 The present invention has for its object to form the method intimated by way of introduction such that it is possible, according to the method, to manufacture a hood which obviates the drawbacks inherent in hoods according to prior art technology, and in particular to improve the sound-suppression capability of the hood. The present invention further has for its object to form the method such that 20 it permits extremely rational production of hoods, at the same time as these can be given an extremely aesthetically attractive appearance.

The present invention also has for its object to design the hood intimated by way 25 of introduction such that this obviates the drawbacks inherent in prior art designs and constructions, and in particular improves the sound-suppression capability of the hood. Finally, the present invention also has for its object to design the hood such that this may be manufactured economically and rationally in large series and that it may be given an aesthetically attractive exterior.

30 **SOLUTION**

The objects forming the basis of the present invention will be attained in respect of the method if this is characterised in that the hood is injection moulded to one

single continuous piece using plastic materials with different properties in at least one respect.

As regards the hood, the objects of the present invention will be attained if the 5 hood is characterised in that it includes at least two mutually contiguous portions or layers which consist of plastic material with different properties in at least one respect.

By injection moulding of a hood where different portions are included in the 10 hood, and where the injection moulded plastic material or materials have different properties in at least one respect, a hood will be realised which suffers from considerably less of a risk of being subjected to resonance oscillations both locally and for the hood as an entity. The hood will have improved sound-suppression capability.

15

Further, the possibility is afforded of extremely rational manufacture.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

20 The present invention will now be described in greater detail hereinbelow, with particular reference to the accompanying Drawings. In the accompanying Drawings:

25 Fig. 1 is a perspective view of a part of a hearing protector employing a hood according to the present invention;

Fig. 2 is a cross section through a first embodiment of a hood according to the present invention; and

30 Fig. 3 is a partial cross sectional, on a larger scale, of a second embodiment of a hood according to the present invention.

DESCRIPTION OF PREFERRED EMBODIMENT

The basic concept behind the present invention is that there should be included, in one and the same hearing protector hood, at least two portions where the material 5 in each portion differs in one way or another as regards oscillation from the material in the other portion or in the remaining portions. Differences which will be topical for consideration here are differences in density, differences in hardness, differences in modulus of elasticity, differences in structure, for example differences between homogeneous and porous plastic materials, 10 differences between plastic materials with open or closed foamed structure, differences between plastic materials with and without different types of fillers, etc. As examples of usable plastics, mention might be made of ABS plastic, polypropylene, polyethylene and polycarbon plastics, TPE, etc.

15 The concept which lies behind the present invention takes as its point of departure the fact that a sound wave, i.e. a mechanical oscillation movement, which propagates in a body will at least partly be reflected and refracted when it impinges on an interface between materials with different properties. The reflected and refracted parts of the sound wave will interfere with each other and 20 with the original sound wave, with a diffusion and attenuation of the sound wave as a result. This phenomenon becomes more manifest the higher the frequency the sound wave has.

If one considers a body, e.g. a hood included in a hearing protector, its oscillation 25 properties are determined by material properties, configuration and dimensions. Different materials oscillate at different frequencies if the remaining properties remain constant. If two bodies which oscillate at different frequencies (e.g. depending upon different material properties in the bodies) are mechanically interconnected, the different oscillations will inhibit one another, whereby 30 resonances are obstructed or reduced.

In Fig. 1, reference numeral 1 relates to a hood included in a hearing protector, the hood being pivotally secured in a stirrup 2 which is intended to extend over the

head of the wearer of the hearing protector. On the side of the hood 1 facing towards the wearer's head, there is provided an abutment ring 3 which is produced from soft, resilient and yieldable material so that it may form itself according to the head of the person wearing the hearing protector, and thereby realise a seal 5 between the interior of the hood, round the ear of the wearer and the ambient surroundings.

When the word "hood" is employed below and in the appended Claims, this refers exclusively to the hood proper without loosely inserted damping material or other 10 equipment and also without the above-mentioned abutment ring.

In the embodiment according to Fig. 2, the hood 1 is produced by injection moulding in accordance with the sandwich method. The hood 1 has a peripheral edge 4 facing towards the wearer's head and along which the above-mentioned 15 abutment ring 3 is secured.

On its outside, the hood 1 has a sprue 5 via which molten plastic material is injected in under high pressure into the mould in which the hood 1 is produced. According to the sandwich method, a first plastic material which is to form the 20 outer casing 6 of the hood and its inner casing 7 is injected in first. When injection of this first plastic material is completed, the injection continues with a second plastic material which is injected interiorly in the material which formed the outer casing and the inner casing. The first and second plastic materials have different material properties in at least one respect, such as density, hardness, etc. The 25 second plastic material forms an intermediate layer 8 between the outer casing 6 and the inner casing 7. It should be observed that the outer casing 6 and the inner casing 7 have a connecting bridge 9 along the peripheral edge 4 of the hood 1. As a result, the material in the intermediate layer 8 will in principle be totally 30 enclosed between the outer casing and the inner casing, possibly apart from the region at the sprue 5.

On injection moulding according to the sandwich method, the plastic material for the outer casing and the inner casing is fed to the moulding tool via a first feeder

screw included in the injection moulding machine. A second feeder screw is employed for injecting the second material for the intermediate layer 8, in which event the tool may either have two separate inlets, one for each screw, or the tool may also be switched from a position for injection via the first screw to a position 5 for injection via the second screw.

In the embodiment according to Fig. 1, the hood 1 has an outer, peripheral portion 10 which extends along the periphery of the hood apart from in its upper region. The bottom of the hood, i.e. substantially its central region, and its upper region 10 are formed from a central portion 11 which is discrete from the outer portion 10 via a separation line 12 which, in practice, is only visual since the material in the outer portion 10 and the central portion 11 in principle form a single, contiguous piece where the different portions have materials with different properties.

15 In one variation of the embodiment according to Fig. 1, the outer portion 10 has a through-going material thickness such that the hood 1 has the same material externally and internally within the region which is defined by the outer portion 10. The corresponding feature naturally applies to the central portion 11.

20 In another variation of the embodiment according to Fig. 1, the material within the outer portion 10 is double, with an outer layer which has a free surface on the outside of the hood, and an inner layer whose material differs from the material in the outer layer. The corresponding applies to the central portion 11, but however the materials in the outer and inner layers have been reversed, so that the material 25 in the outer layer of the outer portion lies on the inside of the central portion 11, while the material in the outer layer within the central portion 11 lies on the inside of the outer layer in the outer portion 10. In the region of the separation line 12, the layers have mutually corresponding apertures and bridges, which will be illustrated more clearly with reference to Fig. 3.

30

Fig. 3 shows a duplex layer construction where the division between the layers may have any optionally formed separation lines which can define considerably

more different regions than applies in Fig. 1, where only two different regions are shown.

In the embodiment according to Fig. 3, the shell 1 has, in its upper region in the 5 Figure, a soft inner layer 13 and a hard outer layer 14. The two layers 13 and 14 are united to one another in a union interface where the materials have been caused to adhere powerfully to one another, possibly by fusion, during the injection moulding cycle proper. In the lower region of the embodiment according to Fig. 3, the soft material is outermost and forms an external band 13' along the 10 peripheral edge 4 of the hood 1. On the inside of this external band 13', the hard material is located and there forms an inner band 14'.

The transition region between the edge area 16 of the hood 1 and its cupola area 15 17 includes alternately disposed bridges 18 and complementary apertures 19 accommodating the bridges 19.

As will be apparent from Fig. 1, an abutment ring 3 extends along the peripheral edge 4 of the hood 1. This has a carrier ring 20 with catches 21 or a circumferential ring for snapping into a groove 22 in the inside of the inner, hard 20 band 14'. For the satisfactory function of the hearing protector, it is of vital importance that a good seal is obtained, on the one hand, between the interior of the hood 1 and the abutment ring 3 and, on the other hand, between the abutment ring 3 and the head of the wearer of the hearing protector. In the embodiment illustrated in Fig. 3, the outer, soft band 13' has been given the form of a seal 23 25 which abuts elastically compressed against the upper side of the carrier ring 20.

The division between the portions 10 and 11 of the hood 1 shown in Fig. 1 has been made merely for purposes of exemplification. Aesthetic considerations may be made in this design, without appreciably affecting the acoustic properties of the 30 hood. On the other hand, it might possibly be expected that a division into more than two different contiguous portions may have a favourable effect on the acoustic properties of the hood.

WHAT IS CLAIMED IS:

1. A method of producing a hood for a hearing protector, the hood being produced by injection moulding of plastic material, **characterised in that** 5 the hood is injection moulded to a single contiguous piece employing plastic materials with different properties in at least one respect.
2. The method as claimed in Claim 1, **characterised in that** plastic materials are employed in both homogeneous and in porous or foamed form. 10
3. The method as claimed in Claim 1 or 2, **characterised in that** at least two different plastic materials are employed.
4. The method as claimed in Claim 3, **characterised in that** plastic 15 materials of different densities are employed.
5. The method as claimed in Claim 3 or 4, **characterised in that** plastic materials of different hardnesses are employed.
- 20 6. The method as claimed in any of Claims 3 to 5, **characterised in that** plastic materials with different modulus of elasticity are employed.
7. A hood for a hearing protector, the hood (1) being produced from plastic by injection moulding, **characterised in that** it includes at least two 25 mutually contiguous portions or layers (6, 7, 8; 10, 11; 13, 14) which consist of plastic materials with different properties in at least one respect.
- 30 8. The hood as claimed in Claim 7, **characterised in that** the portions include an outer and an inner layer (6, 7, respectively) of a plastic material with a first group of properties and an intermediate layer (8) located therebetween and consisting of a plastic material with a second group of properties.

9. The hood as claimed in Claim 7 or 8, **characterised in that** the outer and inner layers (6, 7, respectively) are relatively hard, while the intermediate layer (8) is softer or has foamed structure.

5 10. The hood as claimed in Claim 7 or 8, **characterised in that** the intermediate layer (8) is relatively hard while the outer and inner layers (6, 7, respectively) are softer or have foamed structure.

10 11. The hood as claimed in Claim 7, **characterised in that** the portions include two material layers (13, 14), of which at least one has surfaces which are free towards both the outside of the hood (1) and towards its inside.

15 12. The hood as claimed in Claim 7, **characterised in that** the portions include two material layers (13, 14) which both have surfaces which are free towards the outside of the hood (1) and surfaces which are free towards the inside of the hood.

20 13. The hood as claimed in any of Claims 7 to 12, **characterised in that** at least one of the portions consists of a different plastic material than the other/others.

25 14. The hood as claimed in any of Claims 7 to 13, **characterised in that** a portion (13') is disposed along the peripheral edge (4) of the hood, is produced from a soft and elastic material, and is designed for sealing against the abutment ring (3) which is disposed along the peripheral edge (4) of the hood (1) and designed to abut against the head of the wearer of the hearing protector in which the hood is included.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
18 January 2001 (18.01.2001)

PCT

(10) International Publication Number
WO 01/03623 A1

(51) International Patent Classification⁷: A61F 11/14, (74) Agents: WALLENGREN, Yngvar et al.; Patentbyrån Y
A42B 3/16 Wallengren AB, Box 116, S-331 21 Värnamo (SE).

(21) International Application Number: PCT/SE00/01248

(81) Designated States (national): AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DE (utility model), DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(22) International Filing Date: 15 June 2000 (15.06.2000)

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

(25) Filing Language: English

Published:

— With international search report.

(26) Publication Language: English

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

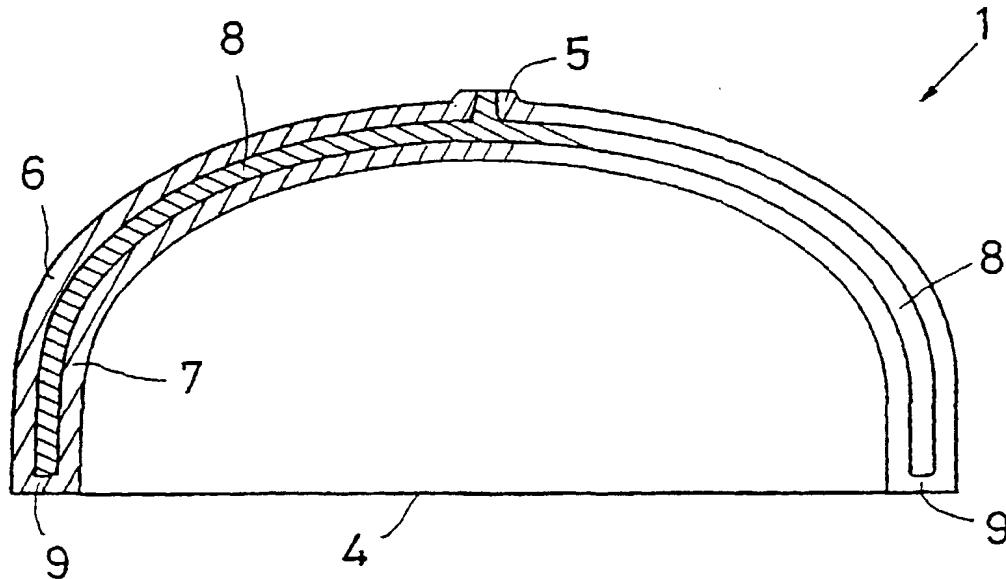
(30) Priority Data:
9902643-7 8 July 1999 (08.07.1999) SE

(71) Applicant (for all designated States except US): PELTOR
AB [SE/SE]; Box 2341, S-331 02 Värnamo (SE).

(72) Inventors; and

(75) Inventors/Applicants (for US only): ANDERSSON,
Magnus [SE/SE]; Gotavagen 19D, S-331 52 Värnamo
(SE). FOLKESSON, Jan [SE/SE]; Rektorsgatan 10,
S-331 33 Värnamo (SE).

(54) Title: A METHOD OF PRODUCING A HOOD, AND A HOOD PRODUCED ACCORDING TO THE METHOD



(57) Abstract: The disclosure relates to a method of producing a hood for a hearing protector by injection moulding of plastic material. The hood (1) is injection moulded to a single contiguous piece employing at least two plastic materials possessing different properties in at least one respect. The plastic materials may be both homogeneous and in porous or foamed form. A hood (1) for a hearing protector is produced from plastic by injection moulding. The hood (1) includes at least two portions or layers (6, 7, 8; 10, 11; 13, 14) which are united to one another. The portions or layers (6, 7, 8; 10, 11; 13, 14) consist of plastic materials with different properties in at least one respect.

WO 01/03623 A1

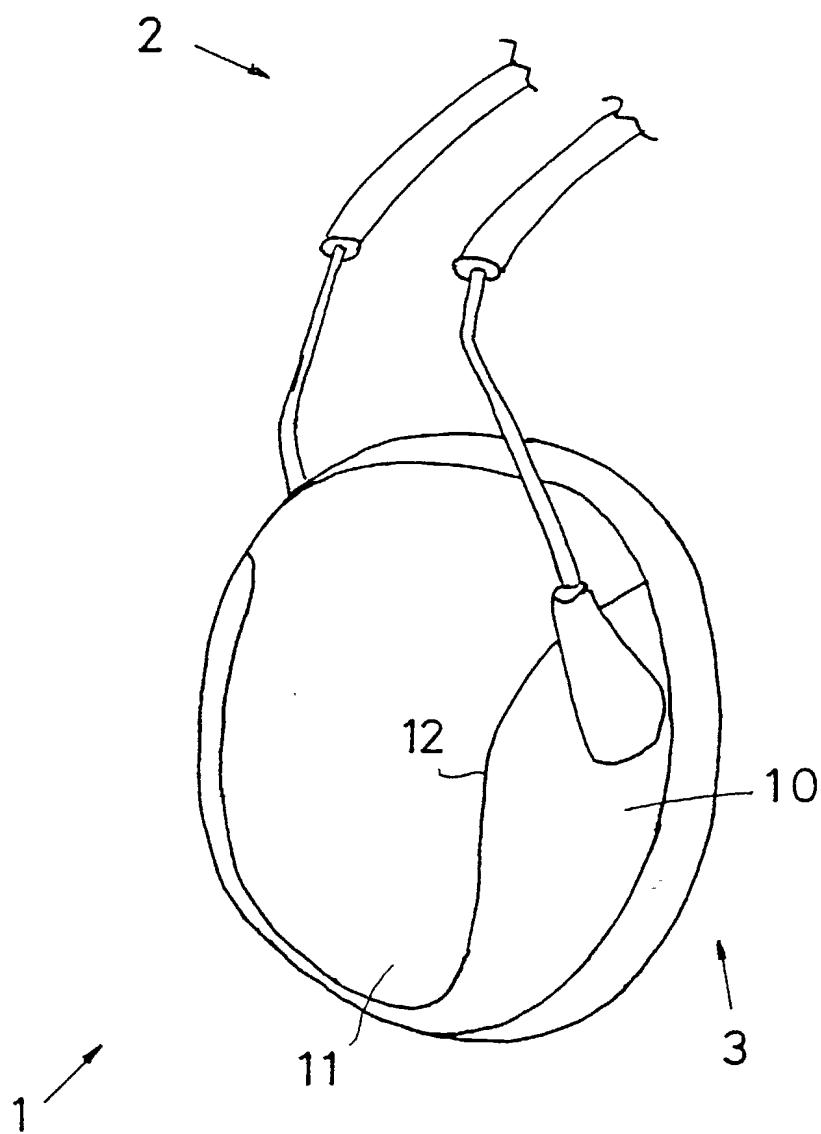


Fig 1

2/2

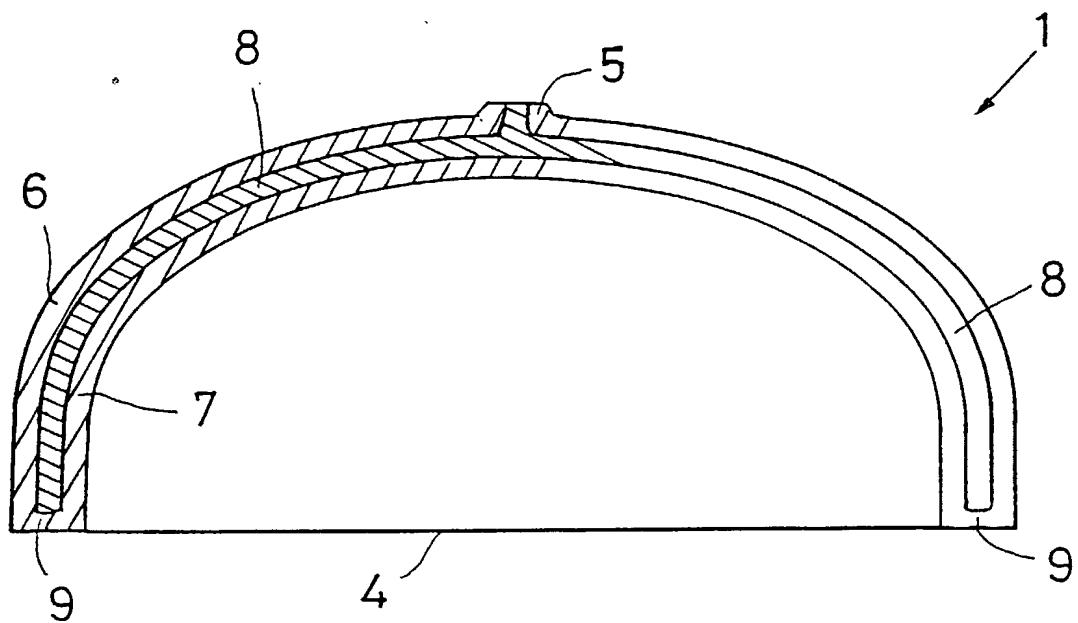


Fig. 2

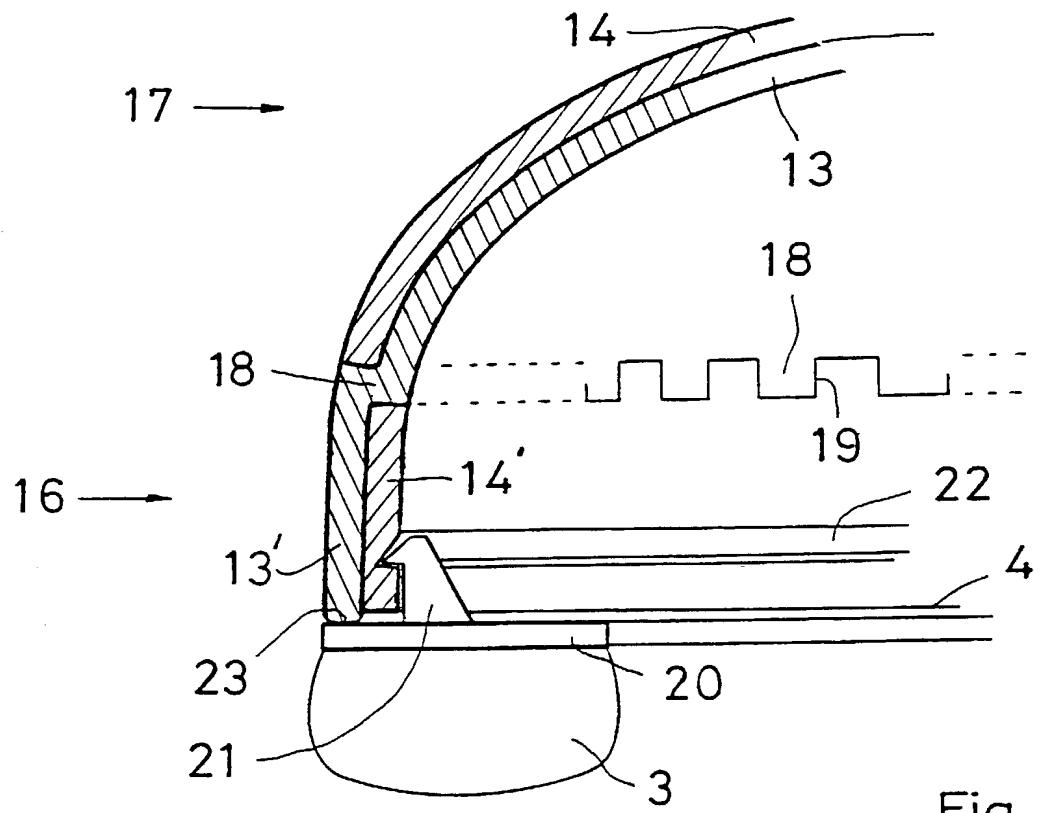


Fig. 3

Combined Declaration for Patent Application and Power of Attorney

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name;

I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

A method of producing a hood, and a hood produced according to the method

, the specification of which

(check
one) is attached hereto.

was filed on June 15, 2000 as Application Serial
No. 10/030,505

and (if applicable) was amended on:

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)			Priority Claimed	
(Number)	(Country)	(Day Month Year Filed)	X	YES NO
9902643-7	Sweden	8 July 1999		
			YES	NO
			YES	NO
			YES	NO
			YES	NO
			YES	NO
			YES	NO

I hereby claim the benefit under Title 35, United States Code, §120 of any United States Application(s) listed below and insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulation, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.)	(Filing Date)	(Status: patented, pending, abandoned)
(Application Serial No.)	(Filing Date)	(Status: patented, pending, abandoned)

I hereby appoint the following attorneys, with full power of substitution, association, and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Michael A. Cantor	-	Registration No. 31,152
Philmore H. Colburn II	-	Registration No. 35,101
Keith J. Murphy	-	Registration No. 33,979
Leah M. Reimer	-	Registration No. 39,341
David A. Fox	-	Registration No. 38,807
Edward J. Ellis	-	Registration No. 40,389
Michael J. Rye	-	Registration No. 34,422
William J. Cass	-	Registration No. 41,659
Pamela J. Curbelo	-	Registration No. 34,676
Andrew Ryan	-	Registration No. 43,070
James F. McLaughlin	-	Registration No. 38,048
Gerow D. Brill	-	Registration No. 34,554
David S. Fishman	-	Registration No. 19,758
Robert J. Feltovic	-	Registration No. 27,710
Juan C. Villar	-	Registration No. 34,271
Herbert M. Bedingfield, Jr.	-	Registration No. P44530
Timothy J. Olson	-	Registration No. 42,962

ADDRESS ALL CORRESPONDENCE TO:

**Michael A. Cantor
CANTOR COLBURN LLP
55 Griffin Road South
Bloomfield, CT 06002 US**

Telephone: (860) 286-2929 Facsimile (860) 286-0115

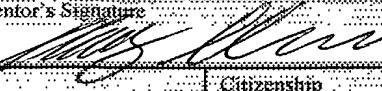
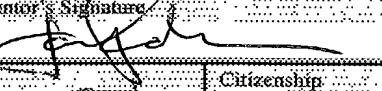
I hereby further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application of any patent issued thereon.



“*It is the first time that I have seen a man who has been to the moon.*”

卷之三

OPENING

Full Name of Sole or First Inventor Magnus ANDERSSON	Inventor's Signature 	Date 020117
Residence Götavägen 19D, SE-331 52 Värnamo, Sweden	Citizenship SE X Swedish	
Post Office Address Gotavagen 19D, SE-331 52 Varnamo, Sweden		
Full Name of Second Joint Inventor, If Any Jan FOLKESSON	Inventor's Signature 	Date 2002-01-07
Residence N. Övergången 10, SE-331 35 Värnamo, Sweden	Citizenship SE X Swedish	
Post Office Address N. Overgangen 10, SE-331 Varnamo, Sweden		
Full Name of Third Joint Inventor, If Any	Inventor's Signature	Date
Residence	Citizenship	
Post Office Address		
Full Name of Fourth Joint Inventor, If Any	Inventor's Signature	Date
Residence	Citizenship	
Post Office Address		
Full Name of Fifth Joint Inventor, If Any	Inventor's Signature	Date
Residence	Citizenship	
Post Office Address		
Full Name of Sixth Joint Inventor, If Any	Inventor's Signature	Date
Residence	Citizenship	
Post Office Address		